

REMARKS

Claims 52-60 will be pending upon entry of this Amendment. This Amendment adds claims 59-60. This Amendment amends claims 52, 57 and 58. In the Office Action, pending claims 52-58 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. patent 6,331,365 ("King"). As discussed below, claims 52 and 57 have been amended to more clearly define the present invention from King and overcome this rejection, and in certain other respects the rejection is respectfully traversed.

I. The King Reference (Fig. 4 Embodiment) and "Substantially Parallel"

In previous correspondence on this application, there has developed a factual issue as to whether the Fig. 4 embodiment of King ("Fig. 4 King") shows a parallel connection between its power battery 48 and its energy battery 24. Applicant maintains that there is not a parallel connection between the power battery and energy battery of Fig. 4 King. However, some clarification of applicant's position on Fig. 4 King is now in order. In a previous response, Applicant stressed the role of diode 26 as preventing the connection between the power battery and energy battery of Fig. 4 King from being a parallel connection.

However, as the Examiner correctly points out in the Current Office Action:

Applicant's argument that the diode 26 of King acts as a switch and disconnects the parallel connection under operating conditions is incorrect. Applicant points to King at col. 3, lines 40-45 which states "For this reasons, a unidirectional conductor shown for example as a diode 26 is connected in positive bus of the DC line 14 between the mechanically rechargeable battery 24 and the inverter 18 so as to preclude power flow to the mechanical battery". First of all the power normally flows from the battery to the inverter, the diode is just to block the reverse power flow to the battery. Therefore the diode does not act as a switch.

(Current Office Action at page 3, lines 8-14.) Upon review, Applicant agrees with the Examiner's characterization of the role of diode 26 in Fig. 4 King. It is not diode 26 that prevents a parallel connection from existing between the power battery and energy battery of Fig. 4 King. Rather, the Fig. 4 King connection is not a parallel connection for reasons that will now be explained.

The *McGraw Hill-Electronics Dictionary* provides the standard definition for those of ordinary skill in the art for a parallel electrical connection:

parallel circuit: A circuit in which the same voltage is applied to all components and the current divides among the components according to their resistances or impedances. (*McGraw-Hill Electronics Dictionary*, Sixth Ed., 1997, p. 328, copy attached hereto as Appendix A.). Also, an Information Disclosure Statement referring to this page is attached to this response to make this definition of record. Applying this definition to the electrical connection between the terminals of the power battery of Fig. 4 King and the terminals of the energy battery of Fig. 4 King, it can be seen that this connection does not meet the definition of a parallel circuit.

Specifically, the terminals of the power battery of Fig. 4 King are indicated by the horizontal, parallel lines respectively above and below the arrow labeled V BAT #2 (the "VBAT #2 Terminals"), and the terminals of the power battery of Fig. 4 King are indicated by the horizontal, parallel lines respectively above and below the arrow labeled V BAT #1 (the "VBAT #1 Terminals"). Because of the operation of boost converter 34, the same voltage is not applied to the VBAT #1 Terminals and the VBAT #2 Terminals. Because the same voltage is not applied to these two sets of terminals, there is not a parallel connection between these two sets of terminals, and not a parallel connection between the power battery and the energy battery of Fig. 4 King. The above-quoted definition of a parallel connection explicitly requires the "same voltage [to be] applied" for a parallel connection to exist, but boost converter 34 means that a substantially different voltage is applied at these two respective sets of terminals.

The operation of boost converter 34 of King will now be explained in order to explain why a different voltage is present at the VBAT #1 Terminals and the VBAT #2 Terminals. Boost converter 34 of Fig. 4 King includes semiconductor switching device TB2, inductor 38 and series diode 26. (King at col. 4, lines 12-23¹). When in a closed position, semiconductor switching device SB2 draws current from energy battery 24, through inductor 38, and returns it to the energy battery. In doing so, the electrical energy withdrawn from the energy battery is converted to energy of a magnetic nature in the magnetic field of the inductor. (King at col. 4, lines 12-16.) Subsequent breaking of this current path, by opening of the semiconductor switching device, causes the inductor's magnetic field to collapse, converting the magnetic energy back into electrical energy. The inductor voltage will rise until current can pass through

¹ The operation of boost converter 34 is provided by King in connection with its Fig. 3 embodiment, but boost converter 34 operates the same way in Fig. 4 King, which is apparently why the operation of boost converter 34 is not explained in detail in King in connection with its Fig. 4 embodiment.

series diode 26, even if the voltage at the power battery terminals is substantially higher than the voltage at the energy battery terminals. (King. At col. 4, lines 16-24.)

Thus, in the circuit of Fig. 4 King, energy can be caused to flow “uphill” from a source at a lower voltage (the V BAT #1 energy battery terminals) to a recipient at a higher voltage (the V BAT #2 power battery terminals). As stated in King, “the inductor acts as a current source creating a voltage across the combination of [the energy battery] and the inductor which is greater than the [energy] battery voltage.” (King at col. 4, lines 20-22) This means that the voltage at right hand side terminals of boost converter 34 is greater than energy battery voltage terminals at the left hand side of boost converter 34. Because the voltage is substantially different at the two sets of terminals, the operation of boost converter 34 prevents a parallel connection from existing between the power battery and energy battery of Fig. 4 King.

It is further noted that the claims have been amended to require only a “substantially parallel” connection, meaning that only substantially the same voltage need be applied at the respective sets of battery terminals. Importantly, electrical energy must be allowed to flow from the higher voltage terminals to the lower voltage terminals at all times, even if things like line resistances, corrosion or even small electrical components prevent the terminal voltages of the first and second batteries from always being exactly equal. Unlike Fig. 4 King, the “substantially parallel” claim language requires that the respective terminal voltages must be substantially the same, especially at steady state operating conditions.

II. Claims 52, 57 and Their Dependent Claims

Claim 52 sets forth a vehicle and has been amended to recite “a first battery circuitry structured to electrically connect the first battery and the second battery **substantially in parallel.**” (emphasis added) Claim 57 sets forth a vehicle and has been amended to recite “a first battery circuitry structured so that the first terminals are **electrically connected substantially in parallel to the second terminals by a substantially parallel connection.**” (emphasis added) As explained above, this substantially parallel connection is not taught or suggested by King (see, especially, Fig. 4 King). Furthermore, the fact that Fig. 4 King even bothers with the additional expense and complexity of providing a voltage boosting converter 34

between its power battery 48 and energy battery 24 teaches away from the substitution of a substantially parallel connection here, where the terminal voltages are substantially the same. For these reasons, it is respectfully submitted that claims 52-54 and 57-58 are patentable over King.

III. Claim 54

Claim 54 (as amended) further recites "the second battery circuitry is further structured so that electrical energy from the regenerative braking system is received by the first battery circuitry to recharge at least second battery." As stated in a previous response, this claim language is inconsistent with the teaching of King. Specifically, King states that "such a battery [24] cannot receive regenerative energy during vehicle deceleration." (King at col. 3, lines 38-40.) King thereby teaches that high energy density batteries, such as its battery 24, cannot receive regenerative braking energy, which strongly teaches away from the above-quoted language of claim 54. This is an additional reason that claim 54 (as amended) is patentable over King.

IV. Claim 55 and Its Dependent Claim(s)

Claim 55 is directed to vehicle having two batteries with respective voltage ranges as recited in claim 55. Claim 55 further recites that "the first battery full charge nominal voltage range and the second battery full charge nominal voltage range substantially overlap." This overlapping relationship between voltage ranges is not taught or suggested by King. Furthermore, the boost converter 34 of Fig. 4 King means that its power battery 48 will be operating at a substantially higher voltage than its energy battery 24 because of the voltage boost provided by boost converter 34. This suggests that the power battery has a higher full charge voltage range than the energy battery and also suggests that the full charge voltage ranges of these batteries would not overlap. For this reason, claims 55-56 are patentable over King.

The Current Office Action states that "King discloses the claimed invention except for the optimum range." As Applicant understands this language, the Current Office Action is referring to the above-quoted language of claim 55. However, claim 55 does not merely claim

an optimum range. Rather it defines a relationship between the voltage of a first battery (e.g., an energy battery) and a second battery (e.g., a power battery). Certainly, it is acceptable to define an invention in terms of relative voltages of various components of an electric circuit, and that is exactly what is happening in the above-quoted language of claim 55. Of course, batteries generally do not exhibit an identical voltage at all times across their terminals, as they are repeatedly discharged and recharged. Because of this somewhat variable nature of battery voltages, claim 55 relates the voltage relationship in terms voltage ranges, and the voltage relationship required by the claim in terms of overlapping voltage ranges. This voltage relationship, while expressed in terms of overlapping ranges is something different than merely optimizing a range.

In fact, claim 55 does not numerically specify or otherwise numerically limit the voltage ranges for either its first or second battery. This is **not** a case of a claim reciting, for example, "the battery is between 1.0 and 1.5 volts." Case law directed to merely discovering optimum ranges therefore does not apply to claim 55.

V. Support For Newly-Added Claims 59-60

Exemplary support for newly added claims is presented below in table form.

Claim(s)	Support In the Specification In the Specification (as Originally Filed)
59	Fig. 3 at ref nums 21; and Fig. 4.
60	Fig. 3; Page 37, line 14 to page 38, line 2.

VI. Patentability Of Newly-Added Claims 59-60

Claims 59 and 60 are patentable over King for at least the reasons discussed above in connection with their respective base claims 57 and 52.

VII. Conclusion

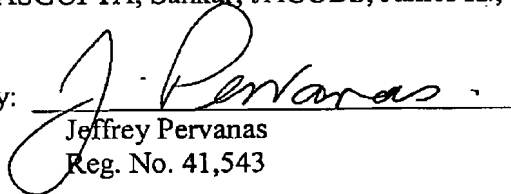
It is submitted that the foregoing amendments and/or explanations are sufficient to put this application in condition for allowance. If the Examiner disagrees, the Examiner is encouraged to call the undersigned at 1-416-961-5000 to expeditiously resolve any outstanding issues.

It is hereby petitioned under 37 CFR 1-1336 that the response term of this application be extended, as necessary, to permit entry of the present amendment. The Commissioner is hereby authorized to charge any necessary extension fee to deposit account no. 18-1350, under an order number corresponding to attorney docket number P63902.

Respectfully requested,

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Information Disclosure Statement

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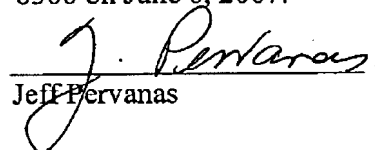
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